https://www.youtube.com/watch?v=iAoi9jTzxcI&t=72s

Steps:

Step 1: Industry receives the empty glass bottles and raw soda ingredients.

Step 2: the glass bottles are verified in a machine and are thoroughly washed which is filling in the soap water and draining out and then filling in the fresh water and draining out

Step 3: the bottles are left to dry and soda making starts

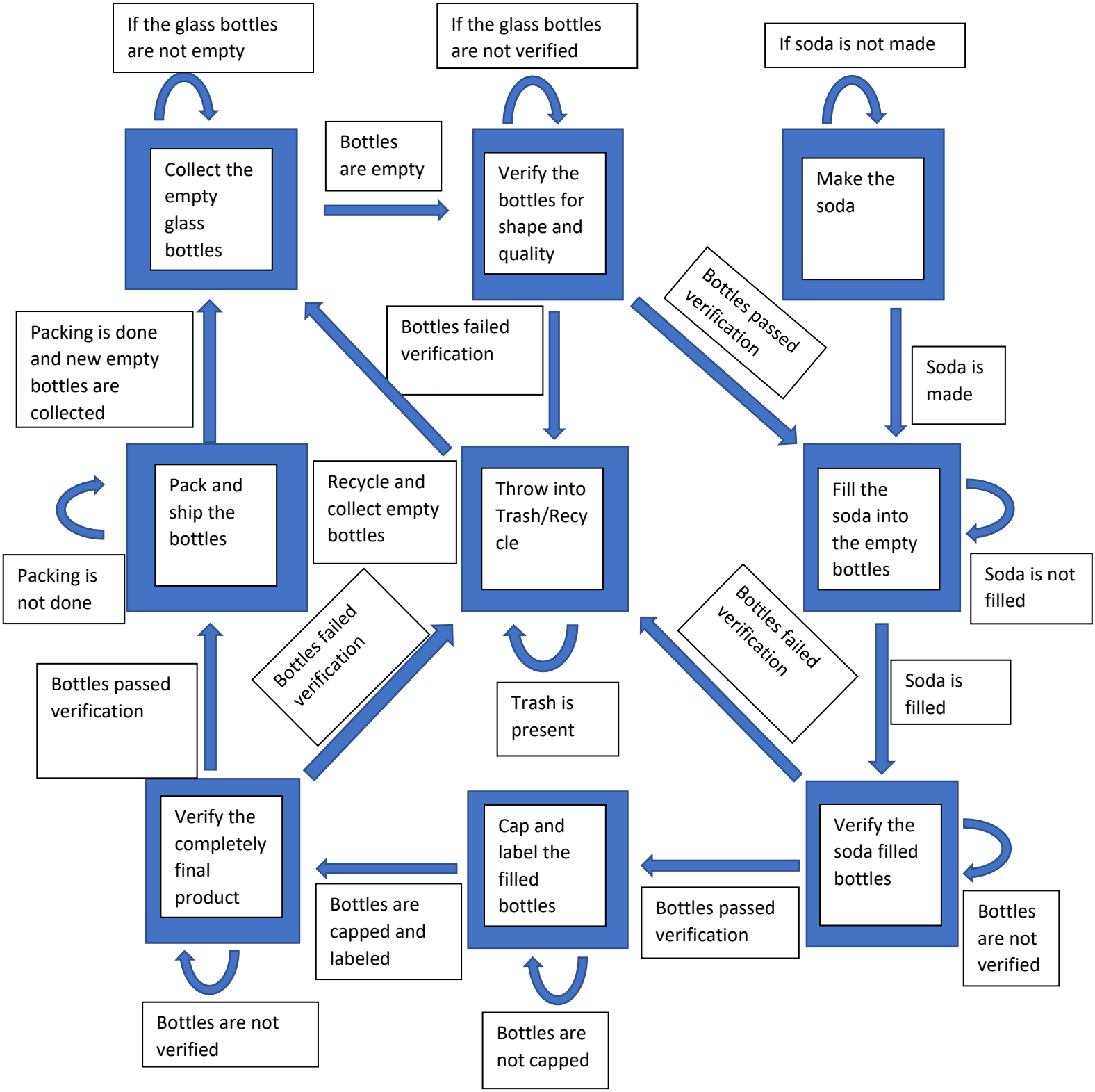
Step 4: the prepared soda is filled into the dried glass bottle with the help of soda filling machine

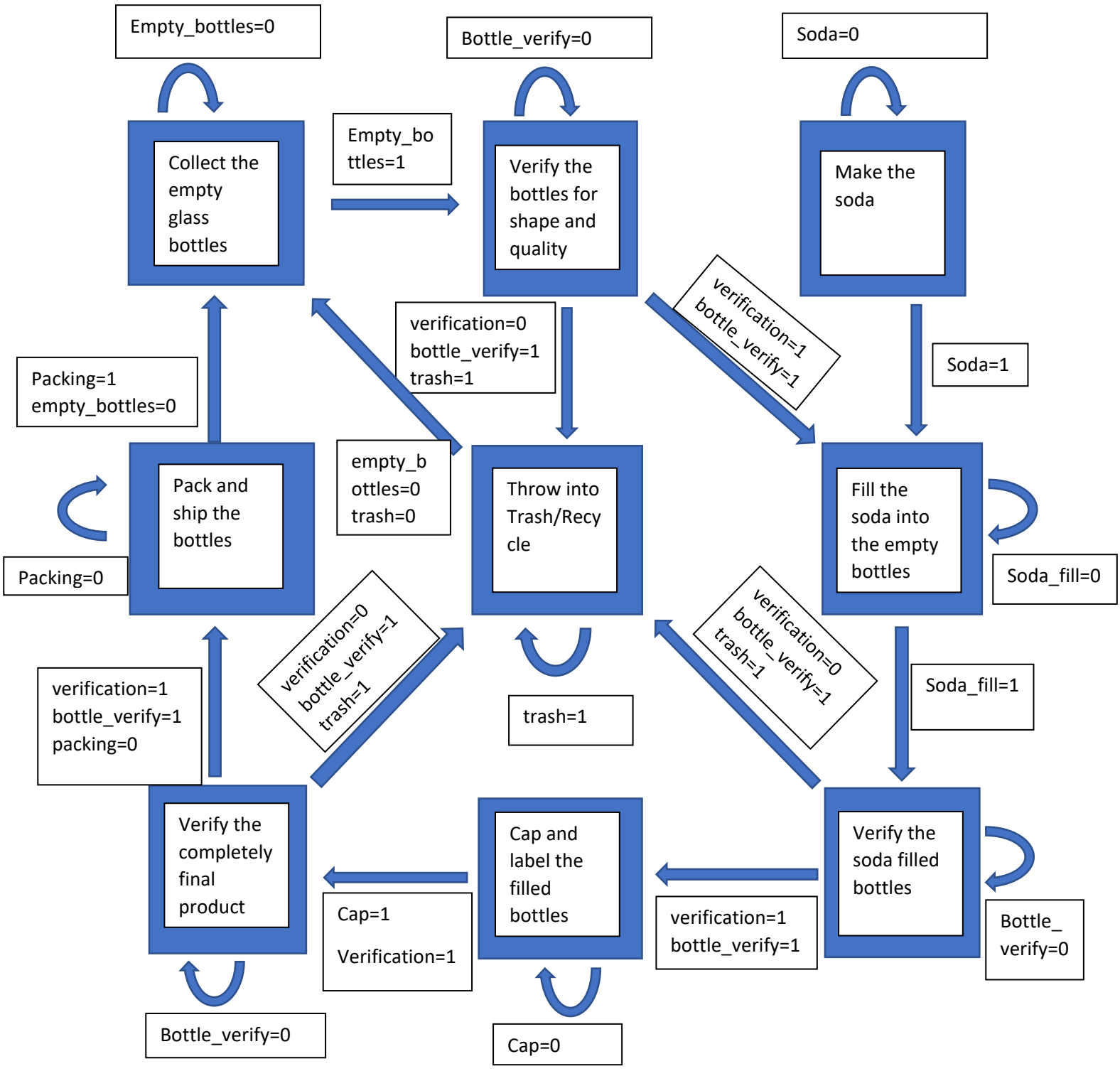
Step 5: the filled soda is sent into the soda level verification machine and the unfilled or bad soda bottles are segregated out

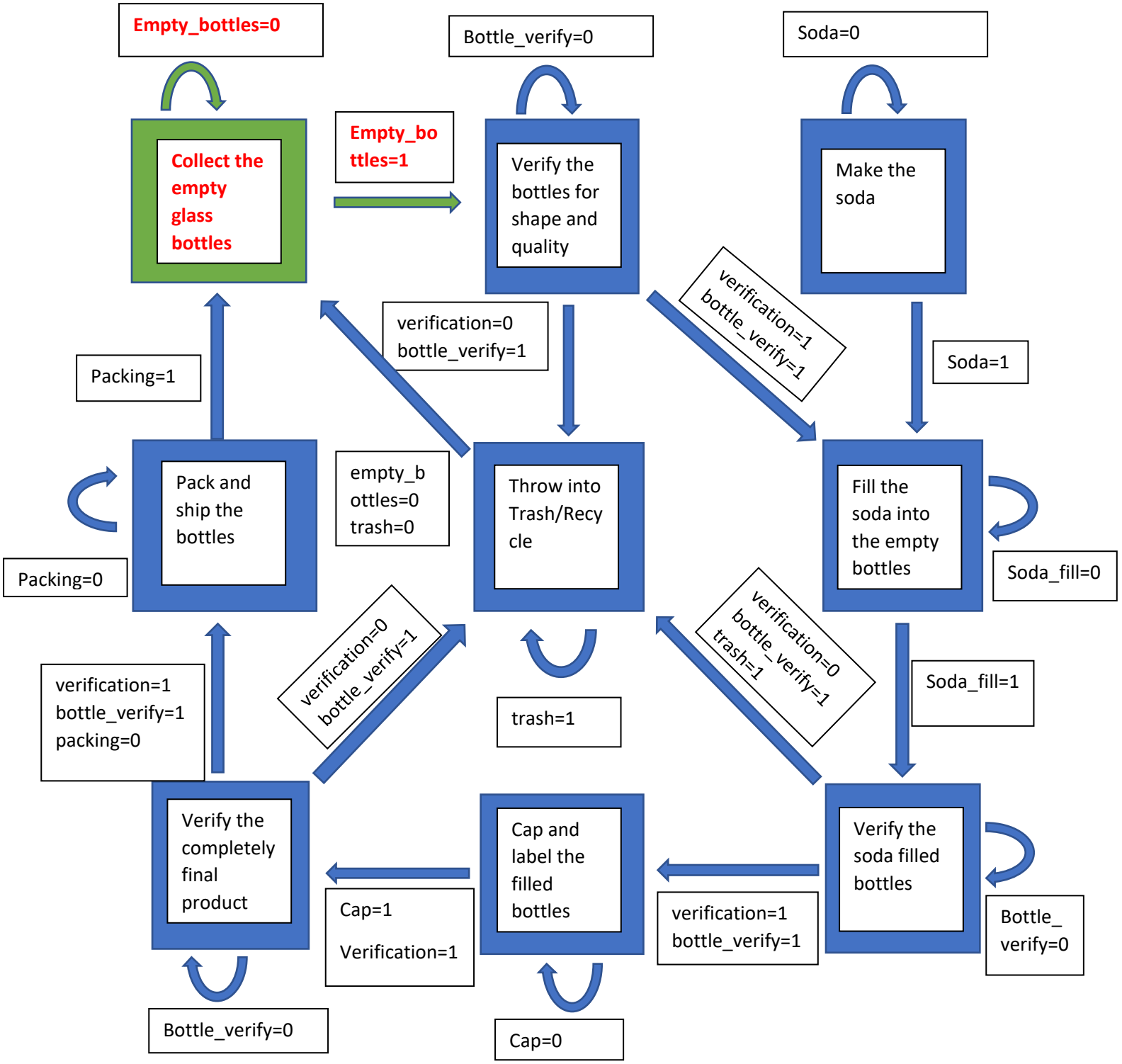
Step 6: the verified soda bottles are capped and labeled and then sent into the packaging

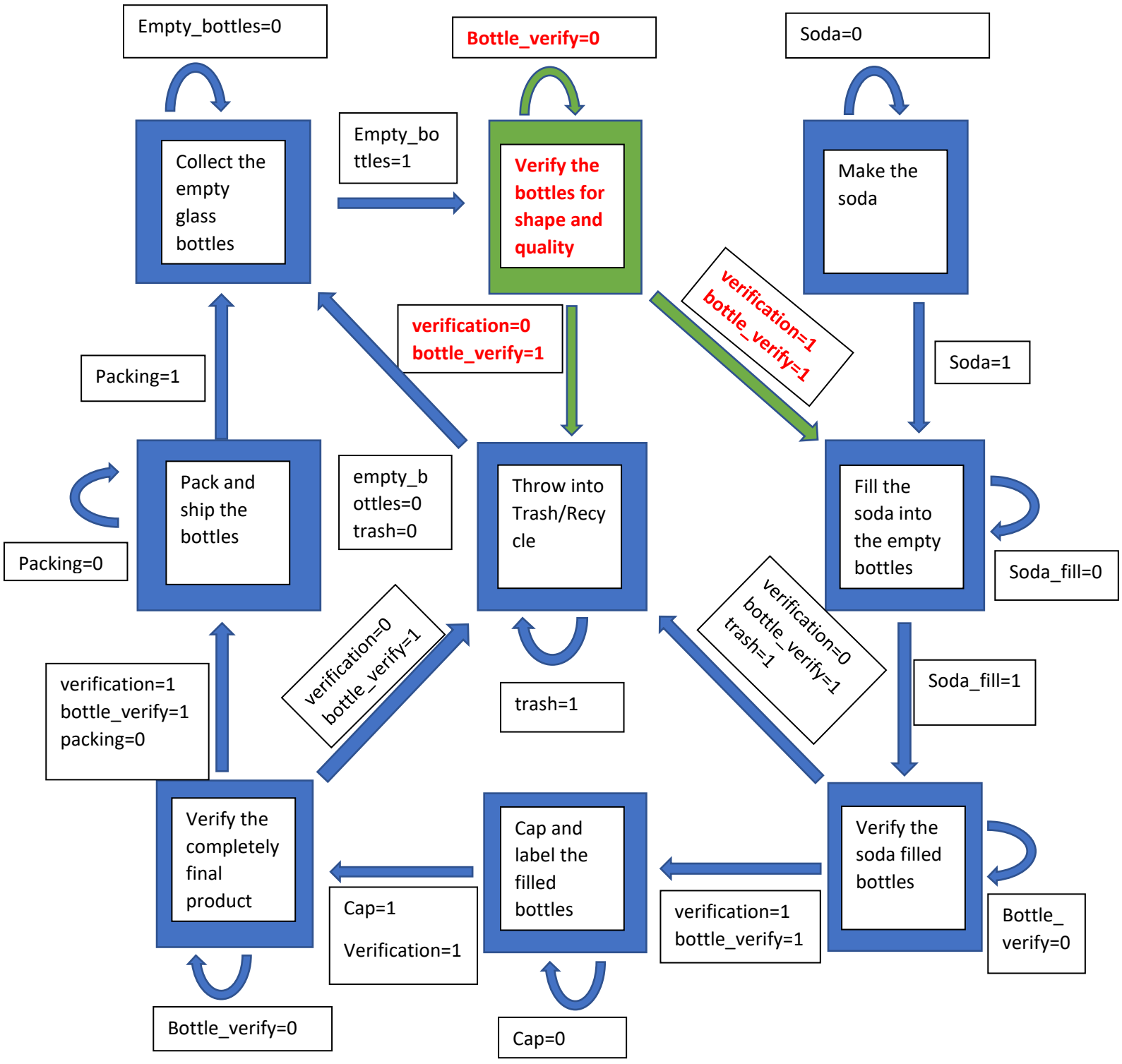
Step 7: the packaging is done and sent to the distributors

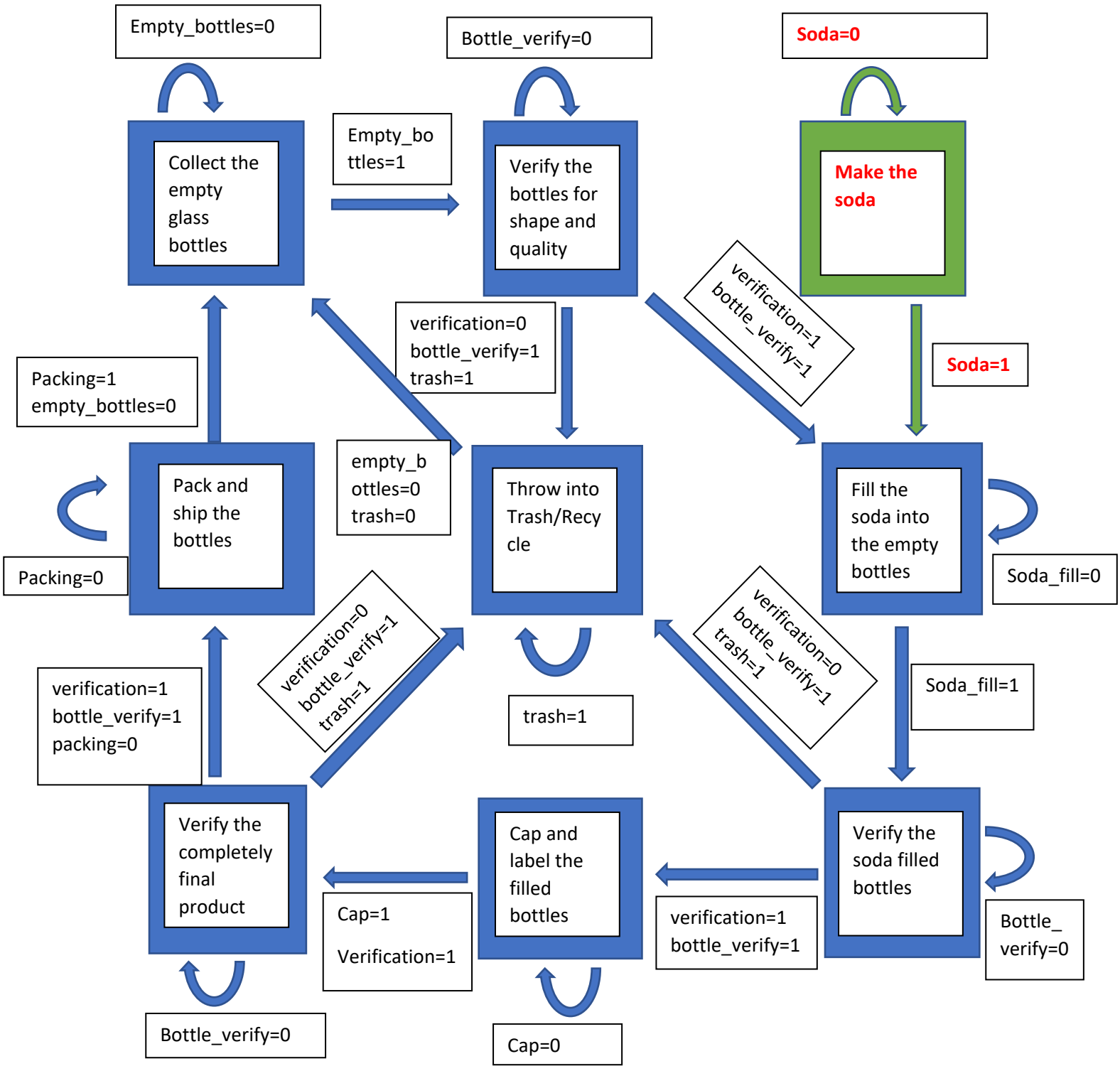
State Diagram

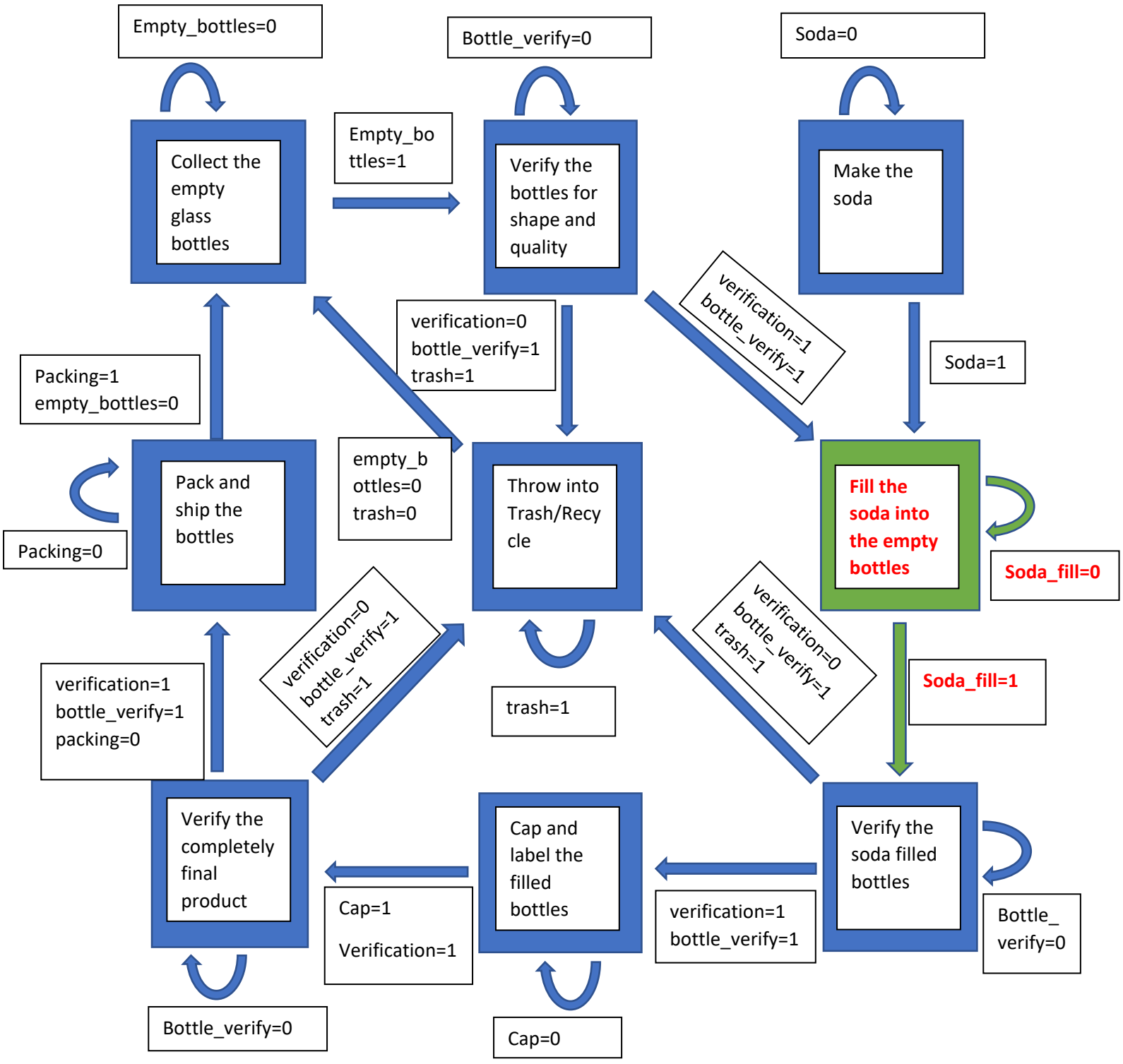

If the glass bottles are not empty
Collect the empty glass bottles
Bottles are empty
If the glass bottles are not verified
Verify the bottles for shape and quality
If soda is not made
Make the soda
Packing is done and new empty bottles are collected
Bottles failed verification
Bottles passed verification
Soda is made
Packing is not done
Pack and ship the bottles
Recycle and collect empty bottles
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda is not filled
Bottles failed verification
Bottles failed verification
Bottles passed verification
Trash is present
Soda is filled
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Bottles are capped and labeled
Bottles passed verification
Bottles are not verified
Bottles are not verified
Bottles are not capped

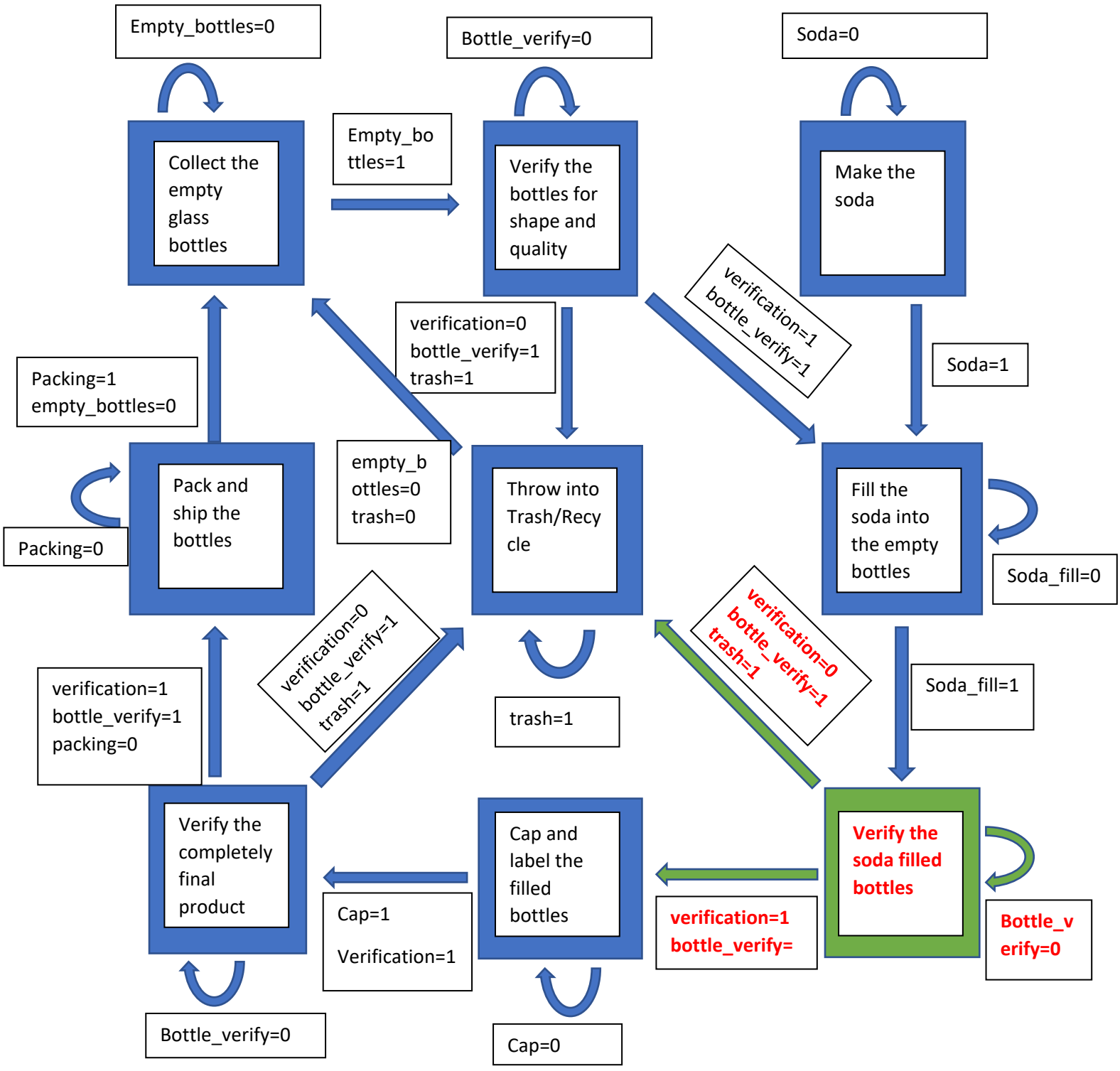

Empty_bottles=0
Collect the empty glass bottles
Empty_bottles=1
Bottle_verify=0
Verify the bottles for shape and quality
Soda=0
Make the soda
verification=0
bottle_verify=1
trash=1
verification=1
bottle_verify=1
Soda=1
Packing=1
empty_bottles=0
Pack and ship the bottles
Packing=0
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0
bottle_verify=1
trash=1
verification=0
bottle_verify=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
trash=1
Verify the completely final product
Cap=1
Verification=1
Cap and label the filled bottles
verification=1
bottle_verify=1
Verify the soda filled bottles
Bottle_verify=0
Bottle_verify=0
Cap=0

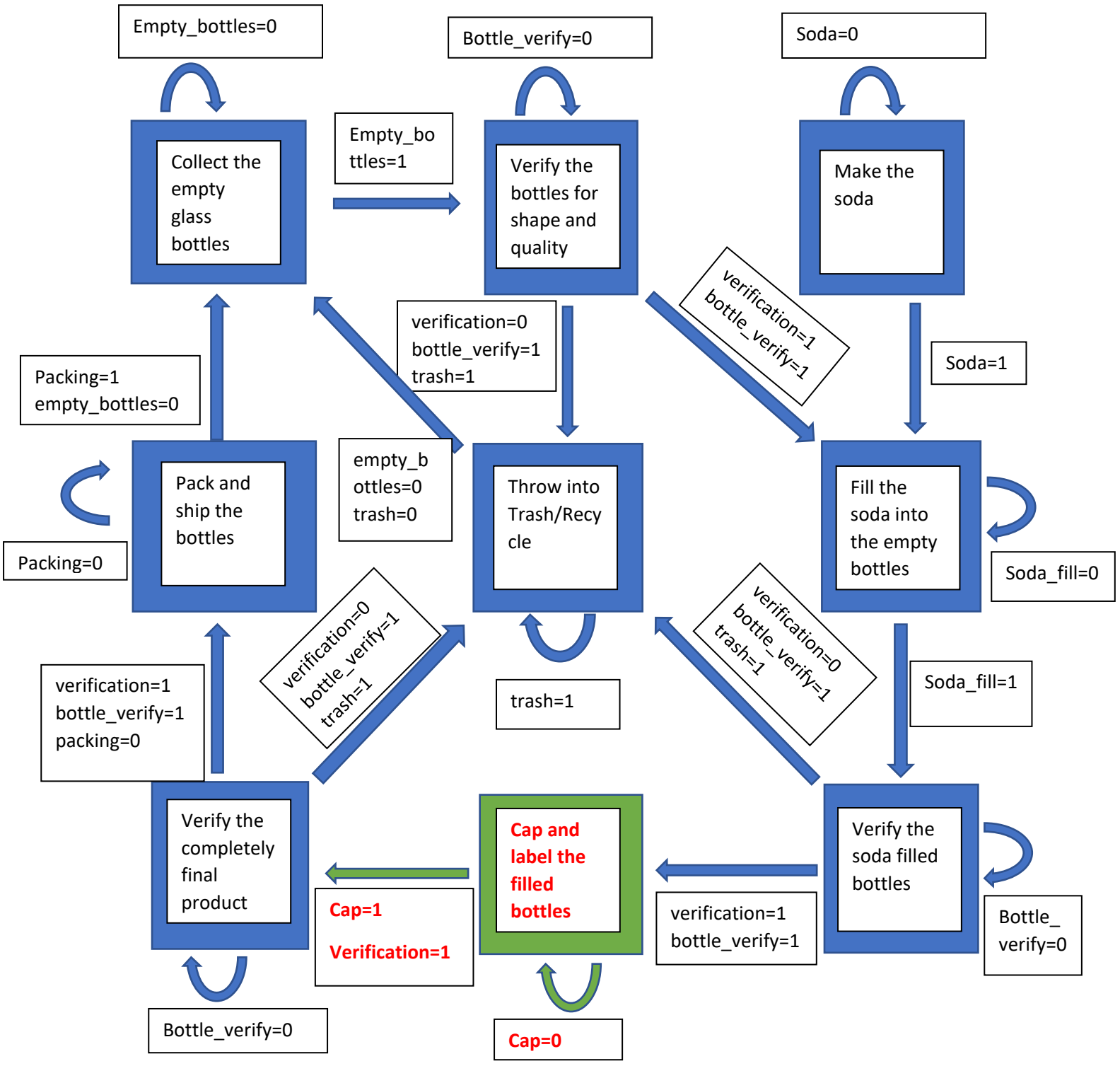

Empty_bottles=0
Collect the empty glass bottles
Empty_bottles=1
Bottle_verify=0
Verify the bottles for shape and quality
Soda=0
Make the soda
verification=1
bottle_verify=1
Soda=1
verification=0
bottle_verify=1
Packing=1
Pack and ship the bottles
Packing=0
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0
bottle_verify=1
verification=0
bottle_verify=1
trash=1
verification=1
bottle_verify=1
packing=0
Soda_fill=1
Verify the completely final product
Cap=1
Verification=1
Cap and label the filled bottles
verification=1
bottle_verify=1
Verify the soda filled bottles
Bottle_verify=0
Bottle_verify=0
Cap=0

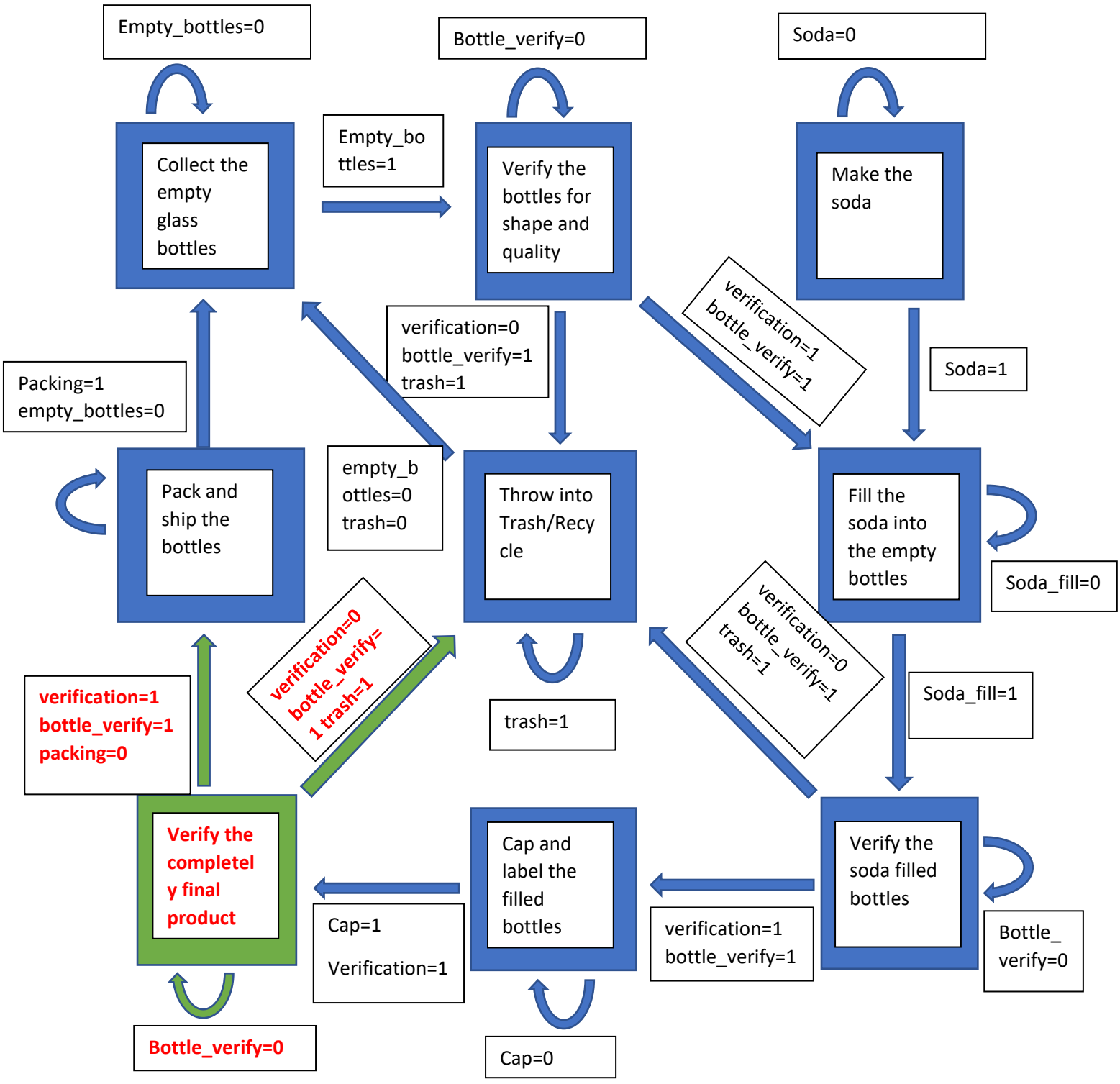

Empty_bottles=0
Collect the empty glass bottles
Empty_bottles=1
Bottle_verify=0
Verify the bottles for shape and quality
Soda=0
Make the soda
Soda=1
verification=1
bottle_verify=1
verification=0
bottle_verify=1
Packing=1
Pack and ship the bottles
Packing=0
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0
bottle_verify=1
trash=1
verification=0
bottle_verify=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
Verify the completely final product
Bottle_verify=0
Cap=1
Verification=1
Cap and label the filled bottles
Cap=0
verification=1
bottle_verify=1
Verify the soda filled bottles
Bottle_verify=0

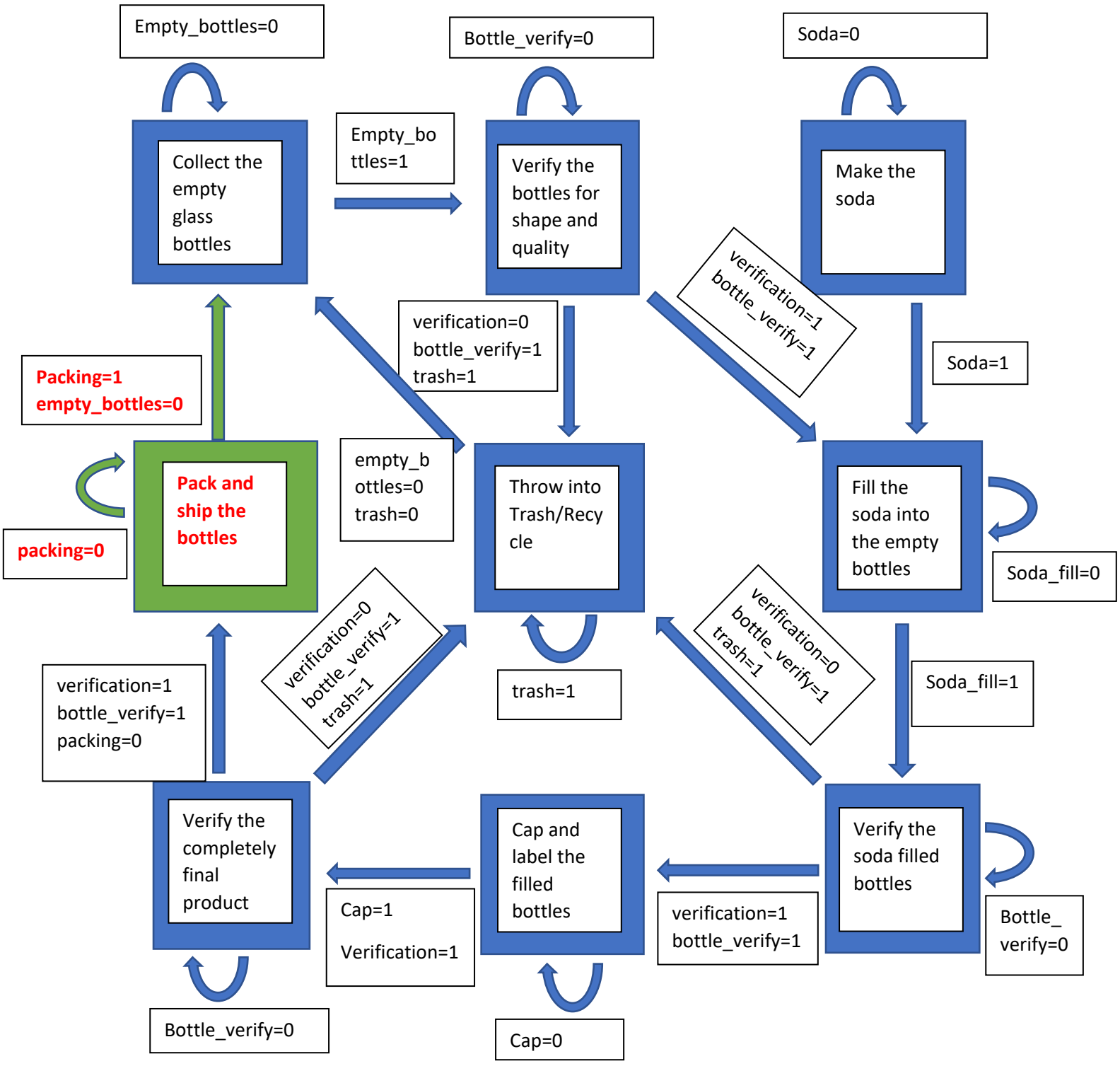

Empty_bottles=0
Bottle_verify=0
Soda=0
Collect the empty glass bottles
Empty_bottles=1
Verify the bottles for shape and quality
Make the soda
verification=1
bottle_verify=1
Soda=1
verification=0
bottle_verify=1
trash=1
Packing=1
empty_bottles=0
Pack and ship the bottles
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
Packing=0
verification=0
bottle_verify=1
trash=1
verification=0
bottle_verify=1
trash=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Cap=1
Verification=1
verification=1
bottle_verify=1
Bottle_verify=0
Bottle_verify=0
Cap=0

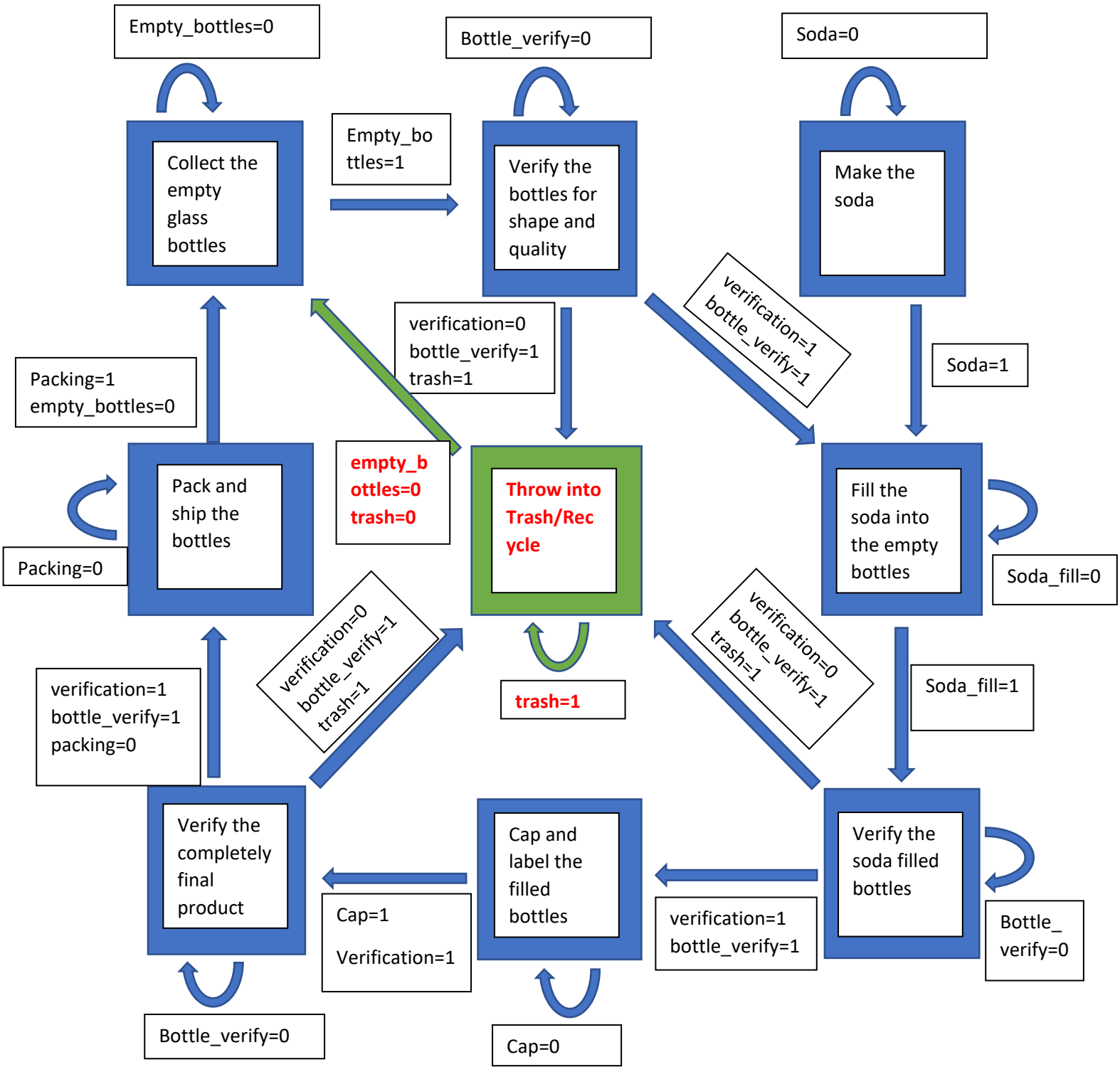

Empty_bottles=0
Bottle_verify=0
Soda=0
Collect the empty glass bottles
Empty_bottles=1
Verify the bottles for shape and quality
Make the soda
verification=1
bottle_verify=1
Soda=1
verification=0
bottle_verify=1
trash=1
Packing=1
empty_bottles=0
Pack and ship the bottles
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
Packing=0
verification=0
bottle_verify=1
trash=1
verification=0
bottle_verify=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
trash=1
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Cap=1
Verification=1
verification=1
bottle_verify=1
Bottle_verify=0
Bottle_verify=0
Cap=0


Empty_bottles=0
Bottle_verify=0
Soda=0
Collect the empty glass bottles
Empty_bottles=1
Verify the bottles for shape and quality
Make the soda
verification=1
bottle_verify=1
Soda=1
verification=0
bottle_verify=1
trash=1
Packing=1
empty_bottles=0
Pack and ship the bottles
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
Packing=0
verification=0
bottle_verify=1
trash=1
verification=0
bottle_verify=1
trash=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Bottle_verify=0
verification=1
bottle_verify=
Cap=1
Verification=1
Bottle_verify=0
Cap=0


Empty_bottles=0
Collect the empty glass bottles
Empty_bottles=1
Bottle_verify=0
Verify the bottles for shape and quality
Soda=0
Make the soda
verification=1
bottle_verify=1
Soda=1
verification=0
bottle_verify=1
trash=1
Packing=1
empty_bottles=0
Pack and ship the bottles
Packing=0
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0
bottle_verify=1
trash=1
verification=0
bottle_verify=1
trash=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Bottle_verify=0
Cap=1
Verification=1
verification=1
bottle_verify=1
Bottle_verify=0
Cap=0


Empty_bottles=0
Bottle_verify=0
Soda=0
Collect the empty glass bottles
Empty_bottles=1
Verify the bottles for shape and quality
Make the soda
verification=1 bottle_verify=1
verification=0 bottle_verify=1 trash=1
Soda=1
Packing=1 empty_bottles=0
Pack and ship the bottles
empty_bottles=0 trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0 bottle_verify=1 trash=1
verification=0 bottle_verify=1 trash=1
Soda_fill=1
trash=1
verification=1 bottle_verify=1 packing=0
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Cap=1 Verification=1
verification=1 bottle_verify=1
Bottle_verify=0
Bottle_verify=0
Cap=0


Empty_bottles=0
Collect the empty glass bottles
Empty_bottles=1
Bottle_verify=0
Verify the bottles for shape and quality
Soda=0
Make the soda
verification=1
bottle_verify=1
Soda=1
verification=0
bottle_verify=1
trash=1
Packing=1
empty_bottles=0
Pack and ship the bottles
packing=0
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0
bottle_verify=1
trash=1
trash=1
verification=0
bottle_verify=1
trash=1
verification=1
bottle_verify=1
packing=0
Soda_fill=1
Verify the completely final product
Cap and label the filled bottles
Verify the soda filled bottles
Cap=1
Verification=1
verification=1
bottle_verify=1
Bottle_verify=0
Bottle_verify=0
Cap=0


Empty_bottles=0
Collect the empty glass bottles
Empty_bottles=1
Bottle_verify=0
Verify the bottles for shape and quality
Soda=0
Make the soda
verification=0
bottle_verify=1
trash=1
verification=1
bottle_verify=1
Soda=1
Packing=1
empty_bottles=0
Pack and ship the bottles
Packing=0
empty_bottles=0
trash=0
Throw into Trash/Recycle
Fill the soda into the empty bottles
Soda_fill=0
verification=0
bottle_verify=1
trash=1
trash=1
verification=0
bottle_verify=1
trash=1
Soda_fill=1
verification=1
bottle_verify=1
packing=0
Verify the completely final product
Cap=1
Verification=1
Cap and label the filled bottles
verification=1
bottle_verify=1
Verify the soda filled bottles
Bottle_verify=0
Bottle_verify=0
Cap=0

Verilog

```
module SodaMachine(clk,reset, empty_bottles, bottle_verify, soda, soda_filling, trash, verification, cap, packing);


input clk,reset,verification;


output reg empty_bottles, soda, soda_filling, trash, cap, packing;


//defining the states


parameter empty_bottles = 4'b0000;

parameter bottle_verify = 4'b0001;

parameter soda = 4'b0010;

parameter soda_filling = 4'b0011;

parameter soda_verification = 4'b0100;

parameter capping_labeling = 4'b0101;

parameter final_verification = 4'b0110;

parameter packing = 4'b0111;

parameter trash = 4'b1000;


reg[2:0] current state, next state;


always@(current_state or empty_bottles or soda)

begin

        case(current_state)


                //in the first state the empty bottles are collected.

                //if they are collected then bottles are sent to next state which is verification for size and shape
```

```
//else they are recycled and again re-collected
 empty_bottles:
        if(empty_bottles==0&&trash==0&&packing==1)
        begin
                next_state=bottle_verify;
                empty_bottles=1;
                bottle_verify=0;
                trash=1;
                packing=0;
        end
        else
        begin
                next_state=current_state;
                empty_bottles=0;
                trash=0;
                packing=1;
        end
//in this state the empty bottles are verified for shape and size.
//if they are verified as okay then bottles are sent to next state which is soda filling state
//else they are sent into trash and are re-cycled
bottle_verify:
        if( empty_bottles==1&&bottle_verify==0&&verification=1)
        begin
                next_state=soda_filling;
                bottle_verify=1;
                soda=1;
                empty_bottles=0;
        end;
        else
```

```
        begin
                next_state=trash;
                bottle_verify=1;
                soda=0;
                empty_bottles=1;
        end
//in this state the soda is prepared.
//if soda is prepae it is sennt to next state which is soda filling state
//else it is refilled

soda:
        if (soda==0)
        begin
                next_state=soda_filling;
                soda==1;
        end
        else
        begin
                next_state=current_state;
                soda=0;
        end
//in this state the empty bottles are filled with soda
soda_filling:
        if(soda==1&&soda_filling=0&&verification==1&&bottle_verify==1)
        begin
                next_state=soda_verification;
                soda=0;
                bottle_verify=0;
                soda_filling=1;
```

```
                end
                else
                begin
                        next_state=current_state;
                        soda_filling=0;
                end
        //in this state the soda bottles are verified for shape and size.
        //if they are verified as okay then bottles are sent to next state which is capping and
labeling
        //else they are sent into trash and are re-cycled

        soda_verification:
                if(soda_filling==1&&bottle_verify==0;verification==1)
                begin
                        next_state=capping_labeling;
                        bottle_verify=1;
                        soda_filling=0;
                        cap=0;
                end
                else
                begin
                        next_state=trash;
                        bottle_verify=1;
                        empty_bottles=1;
        //in this state the soda bottles are capped and labeled.
        Capping_labeling:
        If(bottle_verify==1&cap=0&verification==1)
        Begin
                Next state=final verification;
```

```
        Cap=1;
        Bottle_verify=0;
End
Else
Begin
        Next_state=capping labeling
        Cap=0;
        Bottle_verify=1;
        Verification=1;
End
//in this state the last and final verification is done.
//if they are verified as okay then bottles are sent to next state which is packing
//else they are sent into trash and are re-cycled
Final_verification:
        If(cap==1&bottle_verfiy==0&verification==1)
Begin
        Next state=packing;
        Bottle_verify=1;
        cap=0;
        packing=0;
End
Else
Begin
        Next_state=trash;
        Cap=0;
        Bottle_verify=1;
End
//in this state the bottles are packed
Packing:
```

```
If(bottle_verify==1&packing=0&verification==1)
Begin
        Next state=  empty_bottles;
        packing=1;
        Bottle_verify=0;
        Empty_bottles=0;
        Trash=0;
End
Else
Begin
        Next_state=packing;
        packing=0;
        Bottle_verify=1;
End
//in this state the failed bottles are recycled and sent into the first state.
Trash:
If(verification==0&&bottle_verify==1&&trash=1)
Begin
        Next_state= empty bottles;
        Trash=0;
        Bottle_verify=0;
End
Else
Begin
        Next state=trash;
        Trash=1;
        Packing=0;
        Bottle_verify=1;
end
```